

CLAIMS

1. Method of processing a coded digital signal containing on the one  
 5 hand a set of samples of different types obtained by coding a set of original  
 samples representing physical quantities and on the other hand a set of  
 information representing original samples and parameters used during the  
 coding, characterised in that it includes the following steps:

- determining the subset of samples corresponding to a part of the  
 10 coded digital signal using the set of information,
- obtaining the number of samples of at least one predetermined  
 type and which are contained in the given subset of samples,
- deciding with regard to a modification of the determined subset of  
 samples according to the number of samples obtained.

15 2. Method according to Claim 1, characterised in that the  
 aforementioned steps are effected on reception of a request to obtain the part of  
 the coded digital signal.

3. Method of processing a coded digital signal containing on the one  
 hand a set of samples obtained by coding a set of original samples representing  
 20 physical quantities and on the other hand a set of information concerning the  
 size  $w$ ,  $h$  of the set of original samples and its resolution  $res$ , characterised in  
 that it includes the following steps:

- locating a subset of original samples of given size  $z_{ulx}$ ,  $z_{uly}$ ,  $z_h$ ,  
 $z_w$  and resolution  $z_{res}$  in the set of original samples according to the set of  
 25 information on size  $w$ ,  $h$  and resolution  $res$  of this set,
- determining, amongst the coefficients of the low-frequency sub-  
 band  $LL_0$  of the last decomposition level obtained by decomposition into  
 frequency sub-bands of the set of original samples, the number of coefficients  
 per dimension of the signal which correspond to the located subset,
- 30 - deciding with regard to a modification of the size of this located  
 subset according to the result of the determination step.

4. Method according to Claim 3, characterised in that the decision

step takes into account at least one predetermined criterion representing a required quality level for the restoration of the subset of original samples of the digital signal.

5        5. Method according to Claim 3, characterised in that the decision step takes into account at least one predetermined criterion representing a compromise between the required quality level for the restoration of the subset of original samples and the speed of processing for restoring this subset.

6. Method according to Claim 3, characterised in that it includes a step of modifying the size of the located subset of original samples.

10        7. Method according to Claim 6, characterised in that the modification lies in an increase in the size of the subset of original samples.

8. Method according to Claim 7, characterised in that, by representing, in a space of dimensions corresponding to the dimensions of the digital signal, on the one hand the position of the coefficients of the low-  
15       frequency sub-band of the last decomposition level and on the other hand the position of the subset of original samples delimited by a boundary, the increase in the size of the subset consists of moving its boundary so as to add to this subset at least one coefficient of the low-frequency sub-band per dimension of the digital signal, said at least one added coefficient being situated close to the  
20       boundary before the movement thereof.

9. Method according to Claim 6, characterised in that the modification lies in a reduction in the size of the subset.

10. Method according to Claim 9, characterised in that, by representing, in a space with dimensions corresponding to the dimensions of  
25       the digital signal, on the one hand the position of the coefficients of the frequency sub-bands obtained by decomposition of the set of original samples and on the other hand the position of the subset of original samples delimited by a boundary, the reduction in the size of the subset consists of moving its boundary so as to remove part of this subset and all the frequency sub-band  
30       coefficients situated in this part.

11. Method according to Claim 3, characterised in that the decision step results in a preservation of the size of the located subset of original

samples.

12. Method according to Claim 3, characterised in that it also includes a step of increasing the size of the located subset of original samples which does not change the number of coefficients of the low-frequency sub-band corresponding to said subset.

13. Method according to Claim 3, characterised in that, by representing, in a space of dimensions corresponding to the dimensions of the digital signal, on the one hand the position of the coefficients of the frequency sub-bands obtained by decomposition of the set of original samples and on the other hand the position of the subset of original samples delimited by a boundary, said method includes a step of adding to this subset at least one coefficient of a frequency sub-band other than the low sub-band per dimension of the digital signal, said at least one added coefficient being situated close to the boundary before the movement thereof.

14. Method according to Claim 3, characterised in that the set of original samples of the digital signal is separated into several zones  $T_1, \dots, T_{15}$  which have each independently undergone a decomposition into frequency sub-bands according to at least one decomposition level and the determination step consists of determining, for each zone, amongst the coefficients of the low-frequency sub-band of the last decomposition level obtained by decomposition into frequency sub-bands of the zone in question, the number of coefficients of this sub-band per dimension of the signal which correspond to the located subset.

15. Method according to Claim 3, characterised in that the coded digital signal includes blocks of samples which have been coded independently.

16. Method of decoding a coded digital signal which has been processed by a method of processing a coded digital signal containing on the one hand a set of samples obtained by coding a set of original samples representing physical quantities and on the other hand a set of information concerning the size  $w, h$  of the set of original samples and its resolution  $res$ , characterised in that the processing method includes the following steps:

- locating a subset of original samples of given size  $z_{ulx}, z_{uly}, z_h$ ,

zw and resolution zres in the set of original samples according to the set of information on size w, h and resolution res of this set,

- determining, amongst the coefficients of the low-frequency sub-band  $LL_0$  of the last decomposition level obtained by decomposition into frequency sub-bands of the set of original samples, the number of coefficients per dimension of the signal which correspond to the located subset,

- deciding with regard to a modification of the size of this located subset according to the result of the determination step, the processing method including the following steps,

- the decoding method including the following steps:

- extracting the samples from the coded digital signal corresponding to the located subset of original samples whose size has possibly been modified,

- entropic decoding of these samples,
- dequantisation of the previously decoded samples,
- reverse transformation of the decomposition into frequency sub-bands on the previously dequantised samples,
- restoration of the selected subset of samples.

17. Method according to Claim 16, characterised in that the extraction step consists of extracting from the digital signal the blocks of samples corresponding to the located subset of original samples whose size has possibly been modified.

18. Method according to Claim 16, characterised in that the digital signal is an image signal, the samples of the image being arranged to constitute the rows and columns of this image.

19. Device for processing a coded digital signal having on the one hand a set of samples of different types obtained by coding of a set of original samples representing physical quantities and on the other hand a set of information representing original samples and parameters used during the coding, characterised in that it has:

- means of determining the subset of samples corresponding to a part of the coded digital signal using the set of information,

- means of obtaining the number of samples of at least one predetermined type and which are contained in the given subset of samples,
- means of deciding with regard to a modification of the determined subset of samples according to the number of samples obtained.

5           20. Device for processing a coded digital signal including on the one hand a set of samples obtained by coding a set of original samples representing physical quantities and on the other hand a set of information concerning the size  $w$ ,  $h$  of the set of original samples and its resolution  $res$ , characterised in that it has:

- 10           - means of locating a subset of original samples of given size  $z_{ulx}$ ,  $z_{uly}$ ,  $z_h$ ,  $z_w$  and resolution  $z_{res}$  in the set of original samples according to the set of information of size  $w$ ,  $h$  and resolution  $res$  of this set,
- means of determining, amongst the coefficients of the low-frequency sub-band  $LL_0$  of the last decomposition level obtained by
- 15           decomposition into frequency sub-bands of the set of original samples, the number of coefficients per dimension of the signal which correspond to the located subset,
- means of deciding with regard to a modification of the size of this located subset according to the result of the determination step.

20           21. Device according to Claim 20, characterised in that the decision means take into account at least one predetermined criterion representing a level of quality required for the restoration of the subset of original samples of the digital signal.

25           22. Device according to Claim 20, characterised in that the decision means take into account at least one predetermined criterion representing a compromise between the level of quality required for the restoration of the subset of original samples and the speed of processing for restoring this subset.

              23. Device according to Claim 20, characterised in that it has means of modifying the size of the located subset of original samples.

30           24. Device according to Claim 23, characterised in that the modification means comprise more particularly means of increasing the size of the subset of original samples.

25. Device according to Claim 23, characterised in that the modification means comprise more particularly means of reducing the size of the subset.

26. Device according to Claim 20, characterised in that the decision  
5 means lead to a preservation of the size of the located subset of original samples.

27. Device according to Claim 20, characterised in that it also has means of increasing the size of the located subset of original samples which do not modify the number of coefficients of the low-frequency sub-band  
10 corresponding to said subset.

28. Device according to Claim 20, characterised in that the set of original samples of the digital signal is separated into several zones  $T_1, \dots, T_{15}$  which have each independently undergone a decomposition into frequency sub-bands according to at least one decomposition level and the determination  
15 means determine, for each zone, amongst the coefficients of the low-frequency sub-band of the last decomposition level obtained by decomposition into frequency sub-bands of the zone in question, the number of coefficients of this sub-band per dimension of the signal which correspond to the located subset.

29. Device according to Claim 20, characterised in that the coded  
20 digital signal includes blocks of samples which have been coded independently.

30. Device for decoding a coded digital signal which has been processed by a device for processing a coded digital signal including on the one hand a set of samples obtained by coding a set of original samples representing physical quantities and on the other hand a set of information concerning the  
25 size  $w, h$  of the set of original samples and its resolution  $res$ , characterised in that the processing device has:

- means of locating a subset of original samples of given size  $z_{ulx}, z_{uly}, z_h, z_w$  and resolution  $z_{res}$  in the set of original samples according to the set of information of size  $w, h$  and resolution  $res$  of this set,
- 30 - means of determining, amongst the coefficients of the low-frequency sub-band  $LL_0$  of the last decomposition level obtained by decomposition into frequency sub-bands of the set of original samples, the

number of coefficients per dimension of the signal which correspond to the located subset,

- means of deciding with regard to a modification of the size of this located subset according to the result of the determination step,

5 the decoding device having:

- means of extracting samples from the coded digital signal corresponding to the located subset of original samples whose size has possibly been modified,

- means of entropic decoding of these samples,
- 10 - means of dequantisation of the previously decoded samples,
- means of reverse transformation of the decomposition into frequency sub-bands on the previously dequantised samples,
- means of restoration of the selected subset of samples.

15 31. Device according to Claim 30, characterised in that the extraction means extract from the digital signal the blocks of samples corresponding to the located subset of original samples whose size has possibly been modified.

20 32. Device according to Claim 20, characterised in that it is adapted to process a digital signal which is an image signal, the samples of the image being arranged to constitute the rows and columns of this image.

33. Device according to Claim 19, characterised in that the determination, obtaining and decision means are incorporated in:

- a microprocessor,
- a read only memory containing a program for processing the coded
- 25 digital signal, and
- a random access memory containing registers adapted to record variables modified during the execution of said program.

34. Device according to Claim 20, characterised in that the location, determination and decision means are incorporated in:

- 30 - a microprocessor,
- a read only memory containing a program for processing the coded digital signal, and

- a random access memory containing registers adapted to record variables modified during the execution of said program.

35. Device according to claim 30, characterised in that the extracting, entropic decoding, dequantisation, reverse transformation and restoration  
5 means are incorporated in:

- a microprocessor,
- a read only memory containing a program for decoding the coded digital signal, and

10 - a random access memory containing registers adapted to record variables modified during the execution of said program.

36. A means of storing information which can be read by a computer or a microprocessor storing instructions of a computer program making it possible to implement the processing method according to claim 3.

37. A means of storing information which can be read by a computer  
15 or a microprocessor storing instructions of a computer program making it possible to implement the decoding method according to claim 16.

38. An information storage means which is removable, partially or totally, and which can be read by a computer or microprocessor storing instructions of a computer program making it possible to implement the  
20 processing method according to claim 3.

39. An information storage means which is removable, partially or totally, and which can be read by a computer or microprocessor storing instructions of a computer program making it possible to implement the decoding method according to claim 16.

25 40. A computer program which can be directly loaded into a programmable device, containing instructions or portions of code for implementing the steps of the processing method according to claim 3, when said computer program is executed on a programmable device.

30 41. A computer program which can be directly loaded into a programmable device, containing instructions or portions of code for implementing the steps of the decoding method according to claim 16, when said computer program is executed on a programmable device.